

Notice of Allowability

Application No.

10/771,780

Examiner

Rip A. Lee

Applicant(s)

DIMAIO ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to August 12, 2005.
2. ☒ The allowed claim(s) is/are 16-20 and 22.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Art Unit: 1713

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with James L. Lewis on October 25, 2005.

Cancel claims 1-15 and 23-29.

Claim 16, line 23 replace "Kv₁₀₀" with "KV₁₀₀"

Claim 22, line 3 replace "Kv₁₀₀" with "KV₁₀₀"

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: Claims 16-20 and 22 are allowed over the closest references, Okamoto *et al.* (U.S. 5,629,398) and Datta *et al.* (U.S. 5,981,643).

The present invention is drawn to a lubricant composition comprising a lubricant and a viscosity modifying amount of substantially amorphous poly(alpha olefin) copolymer having a Mw of from about 500 to about 80,000, a M_w/M_n of from about 1.0 to about 10, a KV_{100} of from about 10 to about 10,000, and iodine number of from about 0 to about 10, and a T_g of below about -20 °C. The poly(alpha olefin) is obtained from polymerization of at least one alpha olefin having from 2 to about 20 carbon atoms and at least one bulky olefin (see claim for more details).

Okamoto *et al.* teaches cyclic olefin copolymers derived from a cyclic olefin and at least one alpha-olefin used in a composition comprising lubricant. The copolymers are prepared from metallocene based catalyst systems such as those derived from $Me_2C(Cp)(Flu)ZrCl_2$ and $Ph_2C(Cp)(Flu)ZrMe_2$ in the presence of hydrogen (col. 13, line 35). Ethylene/norbornene copolymers are exemplified, however, other alpha olefins may be used to make copolymers.

Datta *et al.* discloses a method of lowering the glass transition temperature T_g of ethylene/cyclic olefin (*i.e.*, norbornene) copolymers to less than -40 °C by combining with process oils.

None of the cited references teaches use of poly(alpha olefin) copolymers having the recited properties in a lubricant composition, as indicated in the present claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 1713

Information Disclosure Statement

Applicant's response of August 12, 2005 did not include an updated information disclosure statement. Applicants may submit an IDS for examiner's consideration prior to paying the issue fee.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

ral

October 25, 2005



DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER

13. (Withdrawn) The poly(α -olefin) of claim 1 possessing a M_w of from about 500 to about 80,000, a M_w/M_n of from about 1.0 to about 10, a Kv_{100} of from about 10 to about 10,000, an Iodine Number of from about 0.0 to about 10 and a T_g of below about -20°C and wherein the poly(α -olefin) is substantially amorphous.

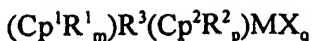
14. (Withdrawn) The poly(α -olefin) of claim 13 possessing a M_w of from about 750 to about 60,000, a M_w/M_n of from about 1.5 to about 5, a Kv_{100} of from about 20 to about 7,500, an Iodine Number of from about 0.1 to about 5 and a T_g of below about -30°C and wherein the poly(α -olefin) is substantially amorphous.

15. (Withdrawn) The poly(α -olefin) of claim 14 possessing a M_w of from about 1,000 to about 40,000, a M_w/M_n of from about 1.75 to about 4, a Kv_{100} of from about 25 to about 5,000, an Iodine Number of from about 0.2 to about 3 and a T_g of below about -40°C and wherein the poly(α -olefin) is substantially amorphous.

~~16.~~¹ (Currently Amended) A lubricant composition comprising a lubricant and a viscosity-modifying amount of a poly(α -olefin) copolymer obtained from the polymerization of at least one α -olefin having from 2 to about 20 carbon atoms and at least one bulky olefin, the process comprising polymerizing the monomers in the presence of hydrogen and a catalytically effective amount of a catalyst comprising the product obtained by combining a metallocene procatalyst with a cocatalyst, the metallocene procatalyst being at least one

Appl. No. 10/771,780
Amdt. dated August 12, 2005
Reply to Office Action of June 20, 2005

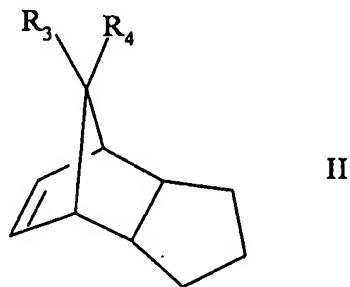
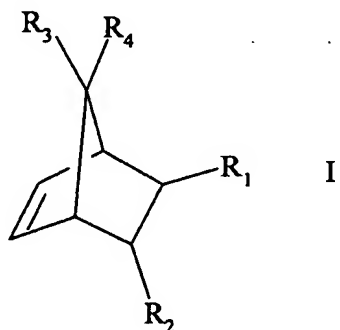
compound of general formula:



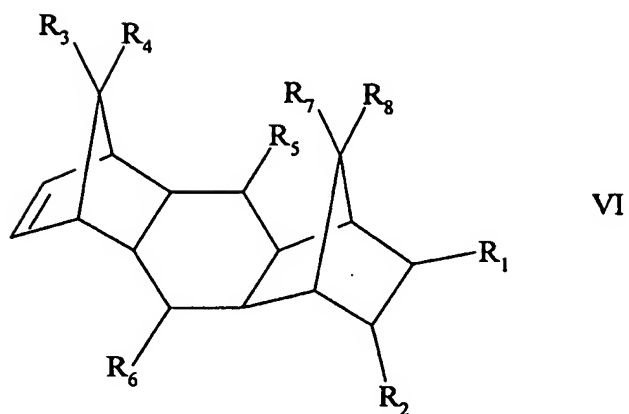
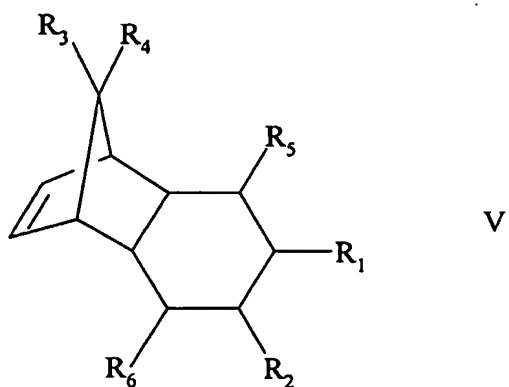
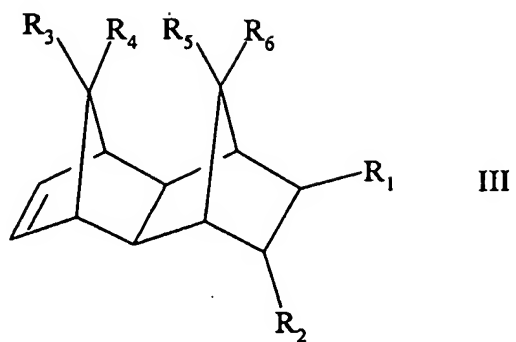
wherein Cp^1 of ligand $(\text{Cp}^1\text{R}^1_m)$ and Cp^2 of ligand $(\text{Cp}^2\text{R}^2_p)$ are the same or different cyclopentadienyl rings, R^1 and R^2 each is, independently, hydrogen or a hydrocarbyl, halocarbyl, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid group containing up to about 20 carbon atoms, m is 0 to 5, p is 0 to 5 and two R^1 and/or R^2 substituents on adjacent carbon atoms of the cyclopentadienyl ring associated therewith can be joined together to form a ring fused to the cyclopentadienyl ring, the fused ring containing from 4 to about 20 carbon atoms, R^3 is a bridging group bridging Cp^1 and Cp^2 , M is a transition metal having a valence of from 3 to 6, each X is a non-cyclopentadienyl ligand and is, independently, halogen or a hydrocarbyl, oxyhydrocarbyl, halocarbyl, hydrocarbyl-substituted organometalloid, oxyhydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid group containing up to about 20 carbon atoms, q is equal to the valence of M minus 2, the cocatalyst being an aluminoxane and it being provided that ligand $(\text{Cp}^1\text{R}^1_m)$ is different from ligand $(\text{Cp}^2\text{R}^2_p)$ and bridging group R^3 contains at least two bulky groups; wherein the poly(α -olefin) possesses a M_w of KV_{100} from about 500 to about 80,000, a M_w/M_n of from about 1.0 to about 10, a Kv_{100} of from about 10 to about 10,000, an Iodine Number of from about 0.0 to about 10 and a T_g of below about -20°C and wherein the poly(α -olefin) is substantially amorphous.

~~17.~~² (Original) The lubricant composition of claim 16 wherein in the metallocene procatalyst, ligand (Cp^1R_m^1) is unsubstituted cyclopentadienyl, ligand (Cp^2R_p^2) is substituted or unsubstituted indenyl or fluorenyl, M^1 is zirconium, R^4 and R^5 each is phenyl and each ligand X is chlorine.

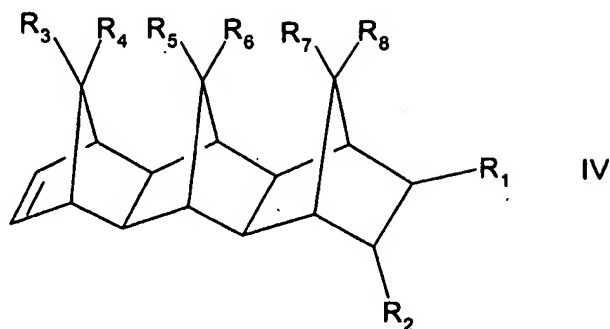
~~18.~~³ (Original) The lubricant composition of claim 16 wherein the bulky olefin is selected from the group consisting of cyclic and polycyclic olefins of the structural formulae:



Appl. No. 10/771,780
Amdt. dated August 12, 2005
Reply to Office Action of June 20, 2005



Appl. No. 10/771,780
Amdt. dated August 12, 2005
Reply to Office Action of June 20, 2005



wherein R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_7 , and R_8 are identical or different and are selected from the group consisting of hydrogen, C_6 - C_{16} aryl moieties, and C_1 - C_8 alkyl moieties, it being possible for identical radicals in the different formulae to have different meanings.

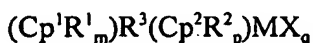
~~19.~~⁴ (Original) The lubricant composition of claim 16 wherein the α -olefin is 1-decene and the bulky olefin is norbornene.

~~20.~~⁵ (Original) The lubricant composition of claim 16 wherein polymerization is carried out under slurry polymerization conditions.

21. (Canceled)

22.⁶ (Currently Amended) The lubricant composition of claim 16 wherein the poly(α -olefin) possesses a M_w of from about 750 to about 60,000, a M_w/M_n of from about 1.5 to about 5, a ~~KV₁₀₀~~^{KV₁₀₀} of from about 20 to about 7,500, an Iodine Number of from about 0.1 to about 5 and a T_g of below about -30°C ~~and wherein the poly(α -olefin) is substantially amorphous.~~

23. (Withdrawn) A method for improving the viscosity index of a lubricant composition comprising adding to the composition a viscosity-modifying amount of a poly(α -olefin) copolymer obtained from the polymerization of at least one α -olefin having from 2 to about 20 carbon atoms and at least one bulky olefin, the process comprising polymerizing the monomers in the presence of hydrogen and a catalytically effective amount of a catalyst comprising the product obtained by combining a metallocene procatalyst with a cocatalyst, the metallocene procatalyst being at least one compound of general formula:



wherein Cp^1 of ligand $(\text{Cp}^1\text{R}^1_m)$ and Cp^2 of ligand $(\text{Cp}^2\text{R}^2_p)$ are the same or different cyclopentadienyl rings, R^1 and R^2 each is, independently, hydrogen or a hydrocarbyl, halocarbyl, hydrocarbyl-substituted organometalloid or halocarbyl-substituted organometalloid group containing up to about 20 carbon atoms, m is 0 to 5, p is 0 to 5 and two R^1 and/or R^2 substituents on adjacent carbon atoms of the cyclopentadienyl ring associated therewith can be joined together to form a ring fused to the cyclopentadienyl ring, the fused ring containing from 4 to about 20 carbon atoms, R^3 is a bridging group bridging